

08/04/2008 4:58:37 PM

ocq

## Process Sheet

CU-DAR001 Dart Helicopters Services

Drawing Name : 350/355 AS X-TUBE FWD

: 38492

Estimate Number : 12485

P.O. Number :

This Issue : 08/04/2008 S.O. No. :

Prsht Rev. : NC

First Issue : // Type : LANDING GEAR

Previous Run : 38491

Written By :

Checked &amp; Approved By : JD 08.4.09

Comment :

Est Rev:A New Issue 06-07-05 JLM

Est Rev:B Update qty of MS21042L5 06-09-12 KJ

Est Rev:C Rev B 07-11-15 DD

Est Rev D Combined manufacturing 08.04.02 EC verified by:  
DD

Part Number : D350748101

Drawing Number : N/A

Project Number : N/A

Drawing Revision : B

Material :

Due Date : 30/06/2008

Qty: 1 Um: Each

## Additional Product

Job Number:



Seq. #: Machine Or Operation:

Description :

1.0

DC

DOCUMENT CONTROL



JD 08.4.23



Comment: Photocopy bluefile &amp; type labels per PPPD350-748-101 CHG001

08/10/24

2.0

D350748141TRN

CROSSTUBE TURNING DETAIL



Comment: Qty: 1.0000 Each(s)/Unit Total: 1.0000 Each(s)

CROSSTUBE TURNING DETAIL

batch B40100

DP-8-10-2

3.0

BENDING

BENDING MACHINE - SKID TUBES



Comment: BENDING MACHINE

Bend tube as per Dwg D350-748-141 using CNC bender program D350F and Folio FT

DP-8-10-2

4.0

QC15

DIMENSIONAL CHECK OF X-TUBES



Comment: DIMENSIONAL CHECK OF X-TUBES

08.10.06

5.0

CROSSTUBES

CROSSTUBES RESOURCE 1



Comment: LANDING GEAR RESOURCE 1

1-Drill Tube as per Dwg D350-748-141 Using DT8876 A,B & C Drill Jigs,  
Set-up drill table as per QSI 010

2-Deburr

08-10-06

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: D350-748-101 PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: D Date: 28/10/27  
 QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR: <u>38492</u>		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			
08.10.06	3	Tube high end narrow after bending.	<p>GP</p> <p>08.10.06 per</p> <p>QSI 042</p>	<p>Cut 3/16" from cuffs.</p> <p>Acceptable</p>	<p>BT</p> <p>08 10 06</p>	<p>S</p> <p>08/10/07</p>	<p>GP</p> <p>08.10.06 per</p> <p>QSI 042</p>	<p>S</p> <p>08/10/07</p>

NOTE: Date & initial all entries

Date: Tuesday, 08/04/2008 4:58:37 PM  
User: Julie Lecocq

## Process Sheet

Customer: CU-DAR001 Dart Helicopters Services

Drawing Name: 350/355 AS X-TUBE FWD

Job Number: 38492

Part Number: D350748101

Job Number:



Seq. #:

Machine Or Operation:

Description :

3-Engrave Part # and Batch # as per Dwg D350-748-141

RT 08-10-06

4-Remove all marks from tube within limits of D350-748-141

- AM 8-10-06

5- Apply a light coat of LPS3 on the interior of tube

Batch: 107912

RT 08-10-07

6.0

QC5

INSPECT WORK TO CURRENT STEP



Comment: INSPECT WORK TO CURRENT STEP

CHECK 10 DEG HOLES WITH DT8876E(EUROCOPTER CLAMP)

S 08/10/07 (40)

7.0

OUTSIDE SERV.10

OUTSIDE SERVICES -skids



Comment: Sub-Contracting OUTSIDE SERVICES

Issue P/O: 7326

Stress relief at 375° for 5 hours

Magnetic Particle Inspect per ASTM E1444

Cadium Plate per AMS-QQ-P-416B, Class 1, Type 2

Embrittle relief at 375° for 8 hours, Chromate Treat

Possible Supplier: Southwest United Industries

Ensure Certificate of Conformity is attached

C 208/10/07  
①

8.0

PACKAGING 1

PACKAGING RESOURCE #1



Comment: PACKAGING RESOURCE #1

Receive & Inspect For Transit Damage

Ensure certificate of conformity is attached

C 8/10/07  
①

9.0

QC5

INSPECT WORK TO CURRENT STEP



Comment: INSPECT WORK TO CURRENT STEP

S 08/10/07

10.0

SPRAY PAINTING

SPRAY PAINTING



Comment: SPRAY PAINTING

1-Prime inside crosstube as per QSI 005 4.2

2-Prime Outside of Tube as per Dart QSI 005 4.2

RT 08-10-22

W/O:		WORK ORDER CHANGES						
DATE	STEP	PROCEDURE CHANGE		By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
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## Process Sheet

Customer: CU-DAR001 Dart Helicopters Services

Drawing Name: 350/355 AS X-TUBE FWD

Job Number: 38492

Part Number: D350748101

Job Number:



Seq. #:

Machine Or Operation:

Description :

11.0

QC14

INSPECT SPRAY PAINT



08-10-23



Comment: Inspect Spray Paint

Then, Wrap in plastic bag to protect from scratches

12.0

D35021

SUPPORT



Comment: Qty.: 2.0000 Each(s)/Unit Total : 2.0000 Each(s)

SUPPORT

Batch: 35783

RT 08-10-23

13.0

D2856400

Abrasion Strip



Comment: Qty.: 1.2401 f(s)/Unit Total : 1.2401 f(s)

Abrasion Strip 7.10" long x2

Batch: 37667

RT 08-10-23

14.0

ALS41032225

Insert



Comment: Qty.: 1.0000 Each(s)/Unit Total : 1.0000 Each(s)

Insert

Batch: 100621

RT 08-10-23

15.0

AN960JD10

Washer



Comment: Qty.: 1.0000 Each(s)/Unit Total : 1.0000 Each(s)

Washer

Batch: 109059

RT 08-10-23

16.0

MS2192020

Clamp (per MIL-DTL-8783C)



Comment: Qty.: 2.0000 Each(s)/Unit Total : 2.0000 Each(s)

Clamp (per MIL-DTL-8783C)

Batch: 107501

RT 08-10-23

17.0

MS27039110

Screw



Comment: Qty.: 1.0000 Each(s)/Unit Total : 1.0000 Each(s)

Screw

Batch: 18836

RT 08-10-23

W/O:		WORK ORDER CHANGES						
DATE	STEP	PROCEDURE CHANGE		By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
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Customer: CU-DAR001 Dart Helicopters Services

Drawing Name: 350/355 AS X-TUBE FWD

Job Number: 38492

Part Number: D350748101

Job Number:



Seq. #:

Machine Or Operation:

Description :

18.0

CROSSTUBES

CROSSTUBES RESOURCE 1



Comment: LANDING GEAR RESOURCE 1

1-Install Ground wire Insert, then insert screw and washer

2-Install Abrasion strips as per Dwg D350-748-141 & QSI 035.

3-Install supports Using Dt8876 as per Dwg D350-748-141, Torque to 60-80 IN-LBS

25 08-10-23

19.0

QC5

INSPECT WORK TO CURRENT STEP



Comment: INSPECT WORK TO CURRENT STEP

08/10/24 (C)

20.0

PACKAGING 1

PACKAGING RESOURCE #1



Comment: PACKAGING RESOURCE #1  
Pick Packing Kit

21.0

D35001

350 SADDLE



Comment: Qty.: 4.0000 Each(s)/Unit Total : 4.0000 Each(s)  
350 SADDLE  
Batch: 41613

SS 08/10/24 (C)

22.0

D35011

BUSHING



Comment: Qty.: 16.0000 Each(s)/Unit Total : 16.0000 Each(s)  
BUSHING  
Batch: B35316

SS 08/10/24 (C)

23.0

AN46A

Bolt



Comment: Qty.: 16.0000 Each(s)/Unit Total : 16.0000 Each(s)  
Bolt  
Batch: M108558

SS 08/10/24 (C)

24.0

AN441A

bolt



Comment: Qty.: 8.0000 Each(s)/Unit Total : 8.0000 Each(s)  
bolt  
Batch: M106032

SS 08/10/24 (C)

W/O:		WORK ORDER CHANGES						
DATE	STEP	PROCEDURE CHANGE		By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
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NOTE: Date & initial all entries



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User: Julie Lecocq

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Customer: CU-DAR001 Dart Helicopters Services

Drawing Name: 350/355 AS X-TUBE FWD

Job Number: 38492

Part Number: D350748101

Job Number:



Seq. #:

Machine Or Operation:

Description :

25.0

AN532A

Bolt



Comment: Qty.: 4.0000 Each(s)/Unit Total : 4.0000 Each(s)

Bolt

Batch: M690da

JS 08/10/24 (4)

26.0

AN960JD416

Washer



Comment: Qty.: 32.0000 Each(s)/Unit Total : 32.0000 Each(s)

Washer

Batch: M108827

JS 08/10/24 (4)

27.0

AN960JD516

Washer



Comment: Qty.: 8.0000 Each(s)/Unit Total : 8.0000 Each(s)

Washer

Batch: M69059

JS 08/10/24 (4)

28.0

MS21042L4

Nut



Comment: Qty.: 24.0000 Each(s)/Unit Total : 24.0000 Each(s)

Nut

Batch: M68145

JS 08/10/24 (4)

29.0

MS21042L5

Nut



Comment: Qty.: 4.0000 Each(s)/Unit Total : 4.0000 Each(s)

Nut

Batch: M108827

JS 08/10/24 (4)

30.0

QC4

INSPECT 100% KITS FOR COMPLETENESS



Comment: INSPECT 100% KITS FOR COMPLETENESS

JS 08/10/24 (4)

31.0

PACKAGING 1

PACKAGING RESOURCE #1



Comment: PACKAGING RESOURCE #1

Identify and pack for shipping as per PPP D350-748-101

Location:

PPP Rev:

Rev B

JS 08/10/24 (4)

W/O:		WORK ORDER CHANGES						
DATE	STEP	PROCEDURE CHANGE		By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
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## Process Sheet

Customer: CU-DAR001 Dart Helicopters Services

Drawing Name: 350/355 AS X-TUBE FWD

Job Number: 38492

Part Number: D350748101

Job Number:



Seq. #:

Machine Or Operation:

Description :

32.0

QC21

FINAL INSPECTION/W/O RELEASE



Comment: FINAL INSPECTION/W/O RELEASE

08/10/27 *[Signature]*

Job Completion



MF 08-10-27

B38492

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

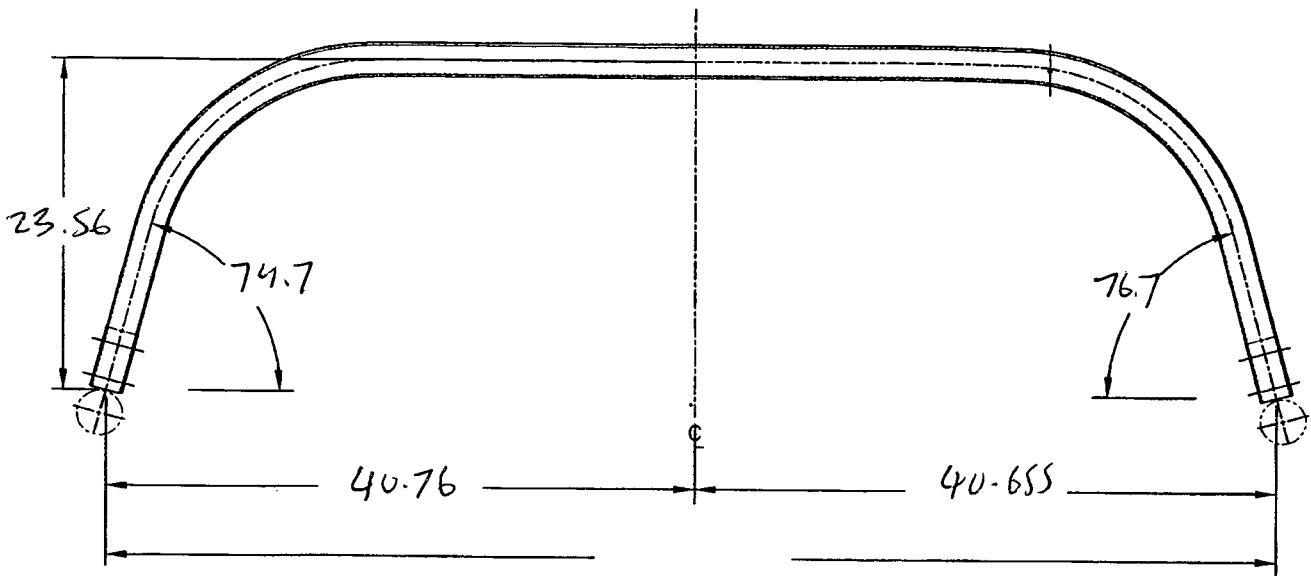
QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

DART AEROSPACE LTD		Work Order:	38492
Description: Crosstube High Fwd (AS350/355)		Part Number:	D350-748-101
Inspection Dwg: D350-748-141 Rev: D		Page 1 of 1	

Required Dimension	Min	Max
Height	23.13	23.37
1/2 Span	40.78	41.02
Angle	75	77
Total Span	81.56	82.04



Comments
Tube high & narrow. Cut 3/16" from cuff.
Tube acceptable

QC15 Inspection	41
Date	08.10.66

Rev	Date	Change	Revised by	Approved
A	07.02.06	New Issue	KJ/JM	[Signature]

**DART**

RELEASED

06.10.31

DESIGN QP	DRAWN BY QP	<b>DART AEROSPACE LTD</b> HAWKESBURY, ONTARIO, CANADA	
CHECKED [Signature]	APPROVED [Signature]	DRAWING NO. D350-748-141	REV. D SHEET 1 OF 3
DATE 06.10.31		TITLE CROSSTUBE (AS 350/355 HI FWD)	SCALE NTS
A	06.03.31	NEW ISSUE	
B	06.06.30	ADD D6017-115 & PRIME AND PAINT	
C	06.08.14	ADD CAD PLATING	
D	06.10.31	MAG. PARTICLE AND CAD PLATE AS MFD.	

QTY	P/N	DESCRIPTION
X	D350-748-141	CROSSTUBE ASSEMBLY (AS 350/355 HI FWD)
1	D6017-115	CROSSTUBE (OR D6015-125)
2	D3502-1	SUPPORT
2	D2856-400-710	ABRASION STRIP
1	AELS-1032-225	INSERT
1	AN960JD10	WASHER
2	MS21920-20	CLAMP (PER DART SPEC. M-MS21920-20)
1	MS27039-1-10	SCREW

**D350-748-141 CROSSTUBE:**

- 1) MATERIAL: MANUFACTURED FROM D6017-115 OR D6015-125  
FINISHED LENGTH = 110.27±0.06
- 2) MACHINE PER MACHINING DETAIL ON PAGE 3. BLEND OUT ALL EDGES FROM MACHINING LONGITUDINALLY, TRANSITIONS SHOULD BE SMOOTH. NOTE: ALL HOLES ARE DRILLED AFTER BENDING.
- 3) SCRIBE DART PART NUMBER AND BATCH NUMBER IN THIS AREA WITH VIBRATING STYLUS
- 4) BEND PROGRESSIVELY WITH A MINIMUM OF 7 PASSES. MAXIMUM TUBE FLATTENING DUE TO BENDING IS 6% BASED ON O.D.
- 5) HEAT TREAT TO MIN. 180 KSI PER MIL-T-6736 OR AMS 2759-1C AFTER TURNING
- 6) FINISH: MAGNETIC PARTICLE INSPECT PER DART QSI 038 4.2  
CADMIUM PLATE PER AMS-QQ-P-416B, CLASS 1, TYPE II  
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2  
PAINT OUTSIDE PER DART QSI 005 4.2
- 7) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE. WHEN DRILLING HOLES EXTREME CARE MUST BE TAKEN AND CAREFUL DEBURRING PERFORMED TO ENSURE A CLEAN HOLE WITH NO CRACKING/CHIPPING/GROOVES.
- 8) INSTALL D2856-400-710 ABRASION STRIP WITH A GAP ON BOTTOM SIDE OF CROSSTUBE, CENTERED OPPOSITE D3502-1 SUPPORT, PER QSI 035.
- 9) TORQUE MS21920-20 CLAMPS 60 TO 80 IN-LB
- 10) TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.
- 11) ALL DIMENSIONS ARE IN INCHES
- 12) PART IS SYMMETRIC ABOUT CENTERLINE EXCEPT FOR Ø0.297 HOLE.

**UNDER REVIEW**07.02/16  
CUT FOR REVIEW  
07.07.22

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W/O:		WORK ORDER CHANGES						
DATE	STEP	PROCEDURE CHANGE		By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

## Chris Provencal

---

**From:** David Shepherd [dshepherd@dartaero.com]  
**Sent:** October 6, 2008 10:31 AM  
**To:** 'Chris Provencal'  
**Subject:** RE: NCR D350-748-141

Chris,

I agree that this tube is worth saving.  
I think I would cut 3/16" off both cuffs so that you are only +1/8" over height.

David

---

**From:** Chris Provencal [mailto:cprovencal@dartaero.com]  
**Sent:** Friday, October 03, 2008 11:08 AM  
**To:** 'David Shepherd'  
**Subject:** NCR D350-748-141

David,

Dan managed to get (3) 350 tubes bent relatively well with no rippling. One was perfect, one had some minor deviations which I signed off. The last one is fairly high and narrow:

Widths are: 40.76" (-0.14") / 40.655" (-0.245") (nominal = 40.9")  
Height is fairly even at: 23.56" (+0.31", nominal = 23.25")

We had trouble in the past because we had shipped a high fwd tube and a low aft tube (some of the first we shipped) which caused the tail to drop several inches. Any height on the tubes brings the tail down by 4x that amount. I figure that 1/8" be cut from the cuffs, which would reduce the height to be within 1/4" of nominal. That would also make the widths and additional 1/32" narrower.

-Chris

No virus found in this incoming message.

Checked by AVG.

Version: 7.5.524 / Virus Database: 270.7.5/1705 - Release Date: 10/3/2008 8:18 AM

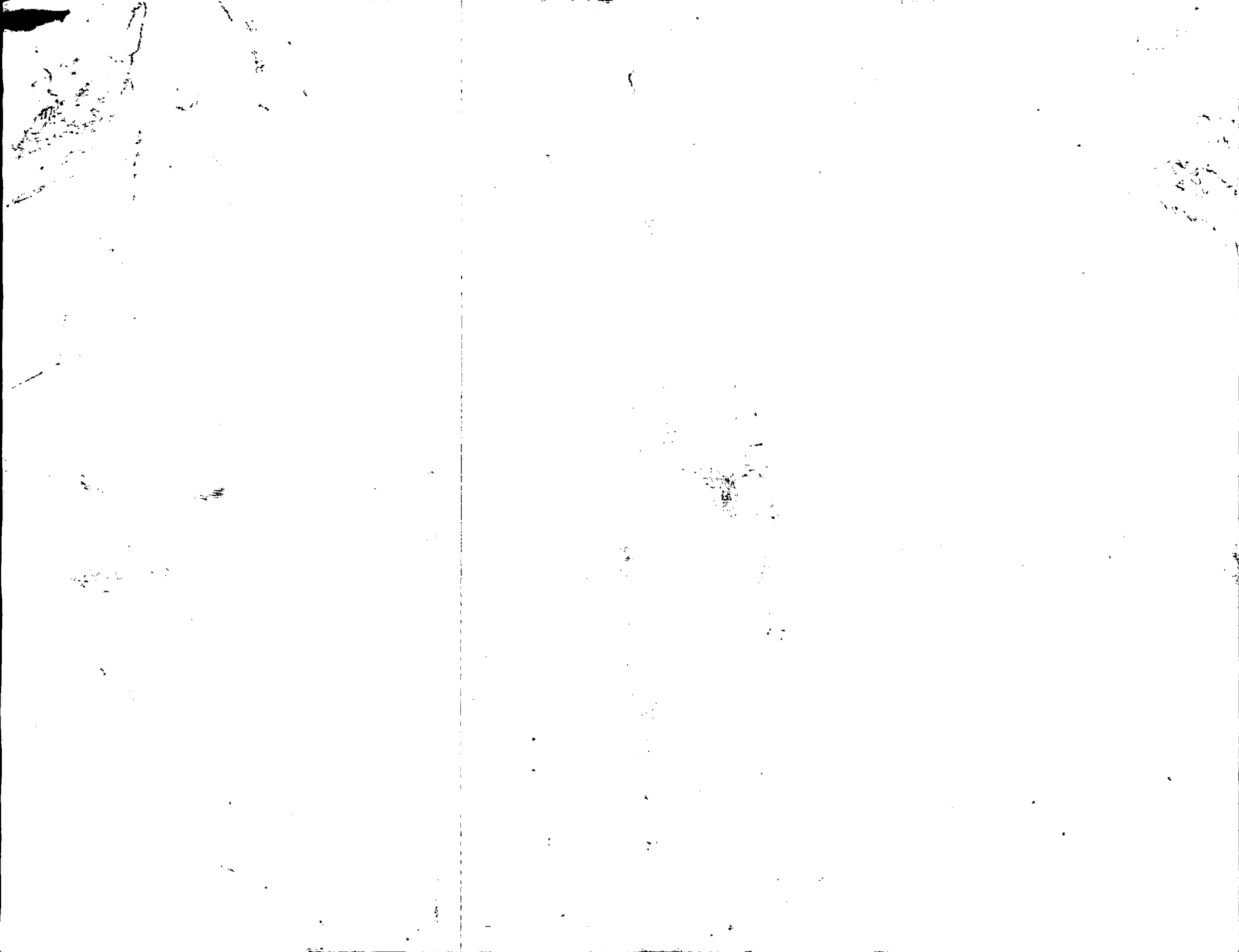
No virus found in this outgoing message.

Checked by AVG.

Version: 7.5.524 / Virus Database: 270.7.6/1710 - Release Date: 10/6/2008 9:23 AM

2008-10-06





**CERTIFICATE OF  
CONFORMANCE**

**CADORATH PLATING CO. LTD.  
2150 LOGAN AVENUE  
WINNIPEG, MANITOBA R2J-0J1**

**DATE:** Oct-17-2008

**CONSIGNED TO:** Dart Aerospace Ltd.  
1270 Aberdeen St  
Hawksbury, ON K6A 1K7

**W/O #:** 80588  
**INVOICE #:** 41382

**CONTRACT OR  
PURCHASE ORDER #** 00007326

**DESCRIPTION:** KID

**QTY** 1

**P/N #** d350-748-101

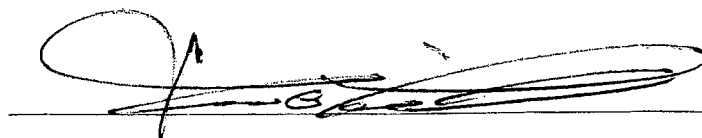
**S/N #** B38492

**MPI IAW ASTM-E-1444. CADMIUM PLATE IAW AMS-QQ-P-416B  
TYPE 2 CLASS 2. BAKE HEAT CHARTS #9725 AND 9741.**

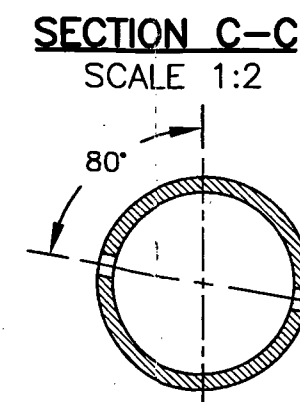
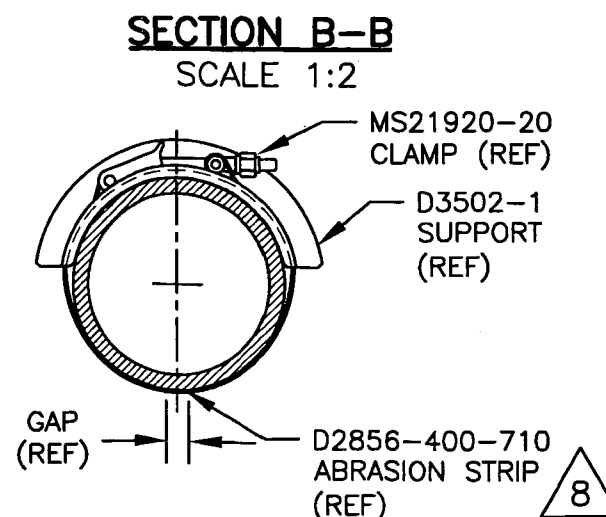
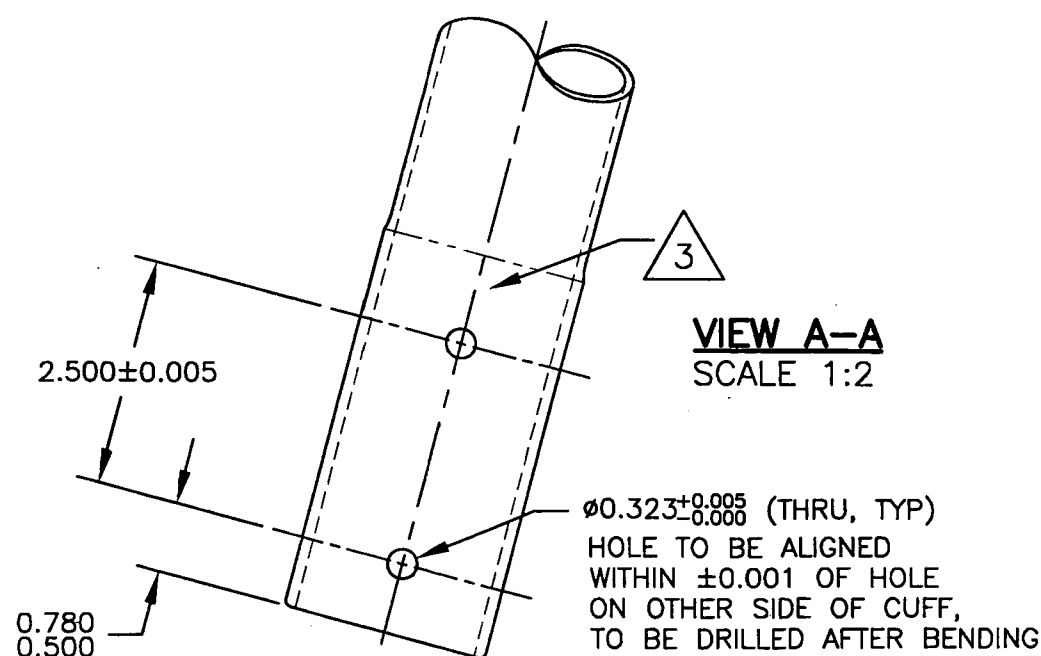
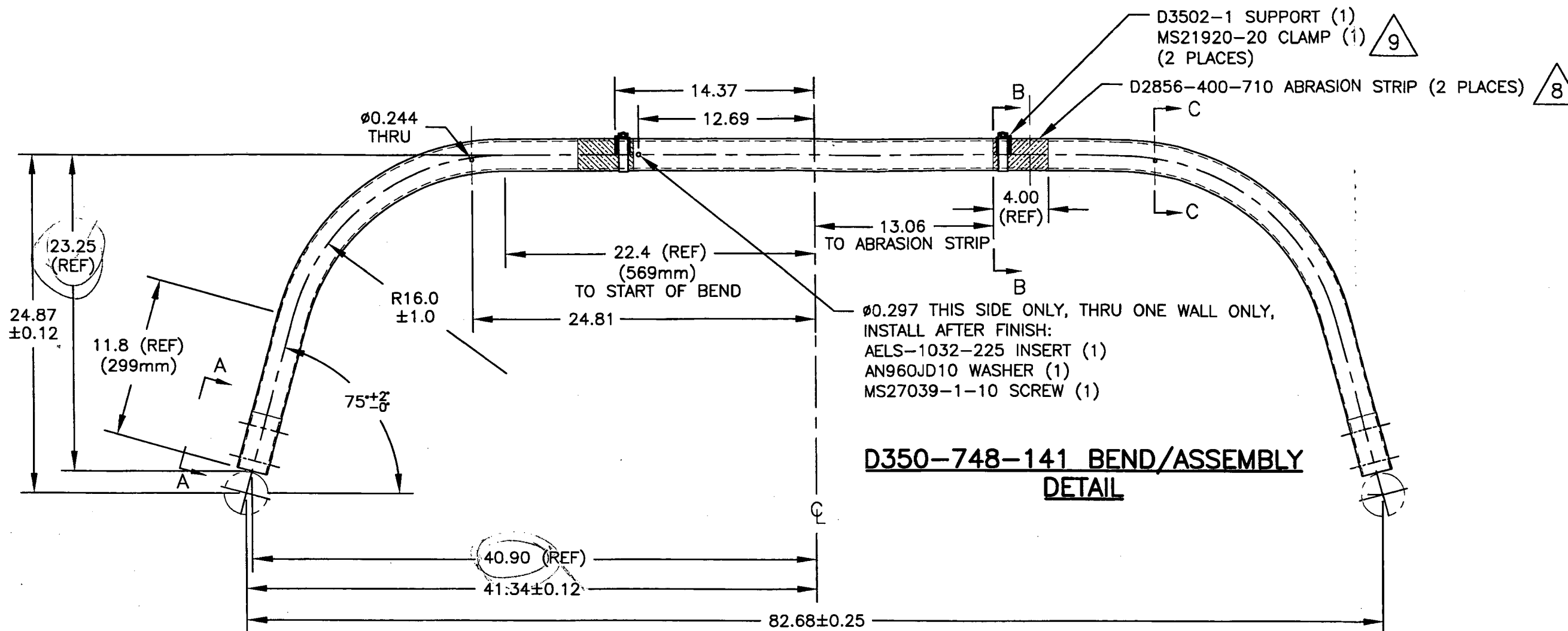
*S*  
*09/10/23*

**CERTIFICATE: I certify that the items indicated here on have  
been inspected and tested and conform to all specifications  
and requirements detailed on the contract or purchase order.**

**Approved Inspector:**







SHOP COPY  
RETURN TO  
ENGINEERING  
UNCONTROLLED COPY  
SUBJECT TO AMENDMENT  
WITHOUT NOTICE  
WORK ORDER  
NO. 38492

UNDER REVIEW!  
07.02/16/11  
CUFF FEEL REDUCED  
OK 07.11.11  
RELEASED  
06.10.31

COPYRIGHT © 2006 BY DART AEROSPACE LTD.		DESIGN	q	DRAWN BY	q	<b>DART</b>	DART AEROSPACE LTD. HAWKESBURY, ONTARIO, CANADA
THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL AND IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS NOT TO BE USED FOR ANY PURPOSE OR COPIED OR COMMUNICATED TO ANY OTHER PERSON WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD.		CHECKED	#	APPROVED	#	DRAWING NO.	REV. D
		DATE	06.10.31			D350-748-141	SHEET 2 OF 3
						TITLE	SCALE
						CROSSTUBE (AS 350/355 HI FWD)	1:8

